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STUDIES IN TUBULIFEROUS THYSANOPTERA.

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U. S. Biological Survey.

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In 1906 the order Thysanoptera embraced fewer than two hundred described species, and of these not more than forty were recorded from America. The task of revising such a small group seemed then to present few difficulties, and the completion of the work within a reasonably short time appeared certain. Now, eight years later, the number of described species is thrice as great and rapidly approaching the thousand mark; while the North American list alone has surpassed the world's total of 1906.

Notwithstanding this progress, most of the recent forms certainly await discovery and description, for Asia, Africa, Australia, and South America are virtually *terra incognita* to the Thysanopterist. Until more descriptive work has been done and the fossil species carefully studied, it will be impossible to propose a much more satisfactory generic classification of the order than the early arrangement by Uzel, based largely upon such characters as sculpture, relative proportion, and form.

The writer has thus limited his studies largely to the maintenance of a catalogue of the known Thysanoptera, and of a monograph of the American species occurring north of the Isthmus of Panama. Each will be published when it has attained a fair degree of completeness or gives promise of lasting use to students of the order. In the mean time, as in the past, new taxonomic groups will be diagnosed as rapidly as possible, and nomenclatorial questions discussed, in brief preliminary papers.

My obligations to Mr. Richard S. Bagnall, the eminent English Thysanopterist; to Mr. J. C. Faure, formerly a student in Cornell University; to Mr. James Zetek, of the Isthmian Canal Commission; and to many other friends, collectors, and collaborators, are acknowledged in detail on almost every page of this paper.

Types are in the writer's collection.

**Trichothrips copiosus** Uzel.

1895. *Trichothrips copiosa* Uzel, Monogr. d. Ordn. Thys., p. 252; Tab. IV, Fig. 32, Tab. VII, Fig. 138-140.  
 1899. *Trichothrips copiosa* Reuter, Acta Soc. pro Fauna et Flora Fennica, vol. XVII, no. 2, p. 25.  
 1904. *Trichothrips copiosa* Schille, Sprawozdan Komisji fizyograficznej Akad. Umiejtnosci w Krakowie, Tom. XXXVIII, p. 17.  
 1907. *Trichothrips copiosa* Buffa, Atti Soc. Tosc. Sci. Nat., Mem., vol. XXIII, p. 70.  
 1909. *Trichothrips copiosus* Bagnall, Ent. Mo. Mag., 2d ser., vol. XX, p. 132.  
 1911. *Trichothrips copiosus* Bagnall, Journ. Econ. Biol., vol. VI, pt. 1, p. 11.

Since its description by Uzel from specimens taken in Bohemia and Lapland, this insect has been recorded from Finland, Poland, Hungary, Italy, and England; and now, for the first time, from the United States, where it has been taken as follows: Penikese Island, Massachusetts, December 23, 1912, and September 5, 1913, R. R. Parker, abundant under bark of Norway maple and on *Polyporus*; Bridgeport, Connecticut, August 8, 1913, H. M. Russell, 4 females and 1 male under bark of elm; Bergen Beach, Long Island, New York, January 24, 1913, R. P. Dow, 2 females and 1 male under bark of oak (Acc. 4164, American Museum of Natural History, one slide now in writer's coll.); Urbana, Illinois, March 13, 1909, James Zetek, 9 females and 5 males under bark on rotten leg. All the specimens examined are apterous.

**Trichothrips beachi** Hinds.

1902. *Trichothrips beachi* Hinds, Proc. U. S. Nat. Mus., vol. XXVI, p. 192, Pl. VII, fig. 79, Pl. VIII, fig. 80.

The original description of this species was based upon a single macropterous female taken under quince bark in early spring, at Amherst, Massachusetts. Both sexes are well represented in the material at hand, which bears the following data: Bennings, D. C., March-April, 1913, J. D. Hood, 28 females and 3 males reared about April 17 from nymphs taken March 23 under dead willow bark; Baldwin, Michigan, August 22, 1908, J. D. H., 4 females and 1 male under dead willow bark;

Mahomet, Illinois, July 27, 1908, J. D. H., 5 females under dead willow bark; Urbana, Ill., February 28, 1889, Dr. John Martin and C. A. Hart, 2 males "under boards" (Ill. State Lab. Nat. Hist., Acc. No. 14749).

All the specimens recorded above are macropterous.

A slide of three females was compared with the type of *beachi* in the collection of the Massachusetts Agricultural College by Mr. R. R. Parker, who pronounced the identification correct.

The thrips recorded by Shull from Huron County, Michigan, under the name *Trichothrips beachi* is the macropterous female of *Trichothrips americanus* Hood, as noted on page 154 of the present paper.

### *Trichothrips karnyi* Hood.

1911. *Trichothrips karnyi* Hood, Ins. Ins. Mens., vol. II, p. 20, Pl. 1, figs. 1-3.

At the time of describing this species the writer separated from the types a large series of a closely allied but supposedly distinct form from Pennsylvania, which he intended to describe later as a new species. A more critical study of these specimens and of a large series of both sexes received from Mr. H. M. Russell shows, however, that these forms can not always be separated with certainty, though the extremes seem sufficiently different in structure and general appearance to require separate designations. The characters given in the following table, though variable, will allow the new form to be separated under the name *Trichothrips karnyi major* subsp. nov. (Plate 3, fig. 1).

(A. Tibiæ of middle and hind legs largely blackish brown; third antennal segment darkened apically.)

(a. Head distinctly longer than broad; antennal segments 4-6 blackish brown, with pedicels abruptly pale yellow; 3 yellow, infuscate apically, distinctly paler than 4.)

b. Head produced beyond eyes, the distance from their anterior margin to the most anterior portion of frontal costa about one-sixth the width of head. Segment 1 of antenna distinctly larger in dorsal aspect than the second, its exposed portion distinctly longer than wide; segment 3 about 2.9 times as long as wide, its sense cones short and about half as long as the longest apical bristles; segment 8 about .7 times as long as 7. Tube about .85 as long as head, much darker in color at base than at apex. General color dark blackish brown, black to the naked eye. Length of living females about 3 mm.; width of prothorax about .53 mm. Nymph bright red in color, the hypodermal pigmentation practically unbroken. (Newton, Pa., Sept., 1911, H. M. Russell) . . . . . *Trichothrips karnyi major* subsp. nov.

bb. Head not noticeably produced beyond eyes, the distance from their anterior margin to the most anterior portion of frontal costa about one-eighth the width of head. Segment 1 of antenna not larger in dorsal aspect than second, its

exposed portion about as wide as long; segment 3 about 2.5 times as long as wide, its sense cones long, slender, usually as long as the longest apical bristles; segment 8 about .8 as long as 7. Tube not more than .8 as long as head, as pale at base as at apex. Color light blackish brown, scarcely black to the naked eye. Length of living females about 2.1 mm.; width of prothorax about .43 mm. Nymph pink in color, the hypodermal pigmentation disposed in minute, distinct, vermilion dots. (Md., D. C., Ill.) . . . . . *Trichothrips karnyi karnyi* Hood.

**Trichothrips semicæcus** Uzel.

1895. *Trichothrips semicæca* Uzel, Monogr. d. Ordn. Thys., p. 249.  
 1909. *Trichothrips semicæcus*, Bagnall, Ent. Mo. Mag., 2d. ser., vol. XX, p. 131.

One female and two males of this species, all apterous, were found by the writer at Bemings, D. C., March 23, 1913, under dead willow bark, in company with numerous nymphs and adults of *Trichothrips beachi* Hinds. It has previously been recorded only from Bohemia (Uzel) and England (Bagnall), and is thus an addition to the American list.

**Trichothrips americanus** Hood.

1908. *Trichothrips americanus* Hood, Bull. Ill. State Lab. Nat. Hist., vol. VIII, art. 11, p. 366, fig. 3, a-c. August 22.  
 1911. *Trichothrips beachi* (nec Hinds), Shull, Pub. 4, Mich. Geol. and Biol. Surv., p. 213.

Through the kindness of Dr. Alexander G. Ruthven, Director of the Museum of Zoology, University of Michigan, I have been able to study Shull's specimen of "*Trichothrips beachi*," recorded by him from Huron County, Michigan. It agrees perfectly with the macropterous paratypes of *T. americanus*, though bearing in Doctor Hinds' writing the following label: "*Trichothrips beachi* Hinds. (Probably this sp.) Det. W. E. Hinds, Nov. 17, 1908." This is the only specimen which has come to hand since the description of the species.

**Trichothrips zonatus** sp. nov.

(Plate 3, fig. 2.)

*Female* (macropterous).—Length about 1.5 mm. Color ochraceous yellow, with head, segments 1, 2, and 4-8 of antennæ, most of prothorax, and apical .7 of tube, dark blackish brown; legs yellow.

Head very slightly longer than wide, rounded in front; vertex abruptly declivous; cheeks subparallel, converging rather abruptly to eyes, sparsely spinose, without lines of sculpture; postocular bristles pointed, twice as long as eyes. Eyes less than one-third as long as head, slightly protruding, half as wide as their interval. Ocelli present; anterior ocellus slightly overhanging, directed forward; posterior ocelli opposite anterior half of eyes,

their diameter fully one-third the width of eyes. Antennæ eight-segmented, about 2.2 times as long as head; segments 1 and 2 subequal in length, distinctly shorter than 3, which is the longest in entire antenna and claviform; 4–8 subequal in length, stout, pedicellate; bristles and sense cones unusually long. Color of antennæ: Segments 1 and 2 blackish brown, 2 paler apically and at middle; 3 yellow, infusate at apex; 4–8 nearly black, distinctly darker than 1 and 2. Mouth cone half as long as width of head, broadly rounded at apex, reaching two-thirds across prosternum.

Prothorax about .7 as long as head and (inclusive of coxæ) twice as wide as long; notum with the midlateral, posterior angular, and posterior marginal bristles unusually long and prominent, pointed; anterior angulars and anterior marginals reduced in size and barely visible; coxal bristles about one-third as long as postoculars. Pterothorax slightly wider than prothorax, darkest in color at sides of metathorax. Wings slender, narrowed apically, darkened with brown at base and in apical third, intervening portion nearly white; fore wings without double subapical fringe on posterior margin. Legs uniform yellow except for the brown ends of tarsi; fore femora shorter than head and slightly more than twice as long as wide; fore tarsi unarmed.

Abdomen moderately broad, about 1.25 times as wide as prothorax. Tube about .8 as long as head and twice as long as basal width, which is 2.5 times the apical; sides nearly straight. Abdominal bristles long, pointed; terminal bristles and those on segment 9 equal in length to tube.

Measurements of holotype: Length 1.46 mm.; head, length .204 mm., width .197 mm.; prothorax, length .144 mm., width (inclusive of coxæ) .288 mm.; pterothorax, width .306 mm.; abdomen, width .360 mm.; tube, length .168 mm., width at base .089 mm., at apex .036 mm. Antennal segments: 1,  $57\mu$ ; 2,  $57\mu$ ; 3, length  $70\mu$ , width  $37\mu$ ; 4,  $53\mu$ ; 5,  $53\mu$ ; 6,  $53\mu$ ; 7,  $51\mu$ ; 8,  $56\mu$ ; total length of antenna .45 mm.

Described from one female taken by sweeping at Corozal, Canal Zone, Panama, October 19, 1911, by Mr. James Zetek.

The chaetotaxy, coloration, and unarmed fore tarsi indicate a very distinct species.

### **Trichothrips ambitus** Hinds.

1902. *Trichothrips ambitus* Hinds, Proc. U. S. Nat. Mus., vol. XXVI, p. 191, Pl. VIII, figs. 81, 82.

This species has not been mentioned in the literature since its original description in 1902 from one female taken at Amherst, Massachusetts. Two males are in the collection before me, one taken in miscellaneous collecting at Carbondale, Illinois, May 19, 1908, by Mr. Charles A. Hart; the other found on a branch of a willow tree at Bluemont, Virginia, August 31, 1913, by the writer. They do not differ sufficiently from Doctor Hinds' characterization of the opposite sex to require a separate description at present.

**Haplothrips graminis** Hood.

1912. *Haplothrips graminis* Hood, Proc. Biol. Soc. Wash., vol. XXV, p. 69, fig. 3.

Notwithstanding its several structural differentia, this species bears a close superficial resemblance to *H. statices* (Haliday), though apparently more southern in distribution. Specimens from Auburn, Alabama, were collected August, 1908, by Dr. W. E. Hinds, and sent me under the name *Anthothrips niger*. It has also been taken at Marshalltown, Iowa, by Mr. E. O. G. Kelly.

**Haplothrips nubilipennis** sp. nov.

(Pl. 3, figs. 3 and 4.)

*Female*.—Length about 1.6 mm. Color blackish brown, with maroon hypodermal pigmentation in head, thorax, and first nine segments of abdomen; segments 1 and 2 of antennæ about concolorous with head; 3–6 yellowish brown, irregularly clouded with darker; 7 and 8 uniform dark yellowish brown, paler than the two basal segments; all tarsi and apex of fore tibiæ, bright yellow.

Head about 1.34 times as long as wide, broadest at about middle; cheeks gently rounded, slightly convergent posteriorly; vertex slightly produced, the anterior ocellus overhanging; dorsal and lateral surfaces with a few, very weak, anastomosing lines, sparsely and briefly spinose; postocular bristles two-thirds as long as eyes, blunt. Eyes one-third as long as head. Posterior ocelli opposite anterior third of eyes. Antennæ 1.8 times as long as head, slender, their form and structure well shown in figures (Pl. 3, figs. 3 and 4); segment three conical, symmetrical, about twice as long as greatest width, subequal in length and width to 2 and 4, with a sense cone on outer, and one on inner, surface. Color of antennæ: Segments 1 and 2 dark blackish brown, the former pale at base, the latter at middle and apex; 3–6 yellowish brown, irregularly clouded with darker; 7 and 8 uniform dark yellowish brown, paler than the two basal segments. Mouth cone normal to genus.

Prothorax about .6 as long as head and (inclusive of coxæ) about 2.2 times as wide as long, surface nearly smooth; anterior marginal bristles greatly reduced in size and barely visible; other blunt, the two pairs at the posterior angles about as long as postoculars, midlaterals and anterior angulars two-thirds as long. Wings distinctly narrowed at middle, clouded with gray, the fore pair with a nearly black, sharply defined patch at base and another paler and more suffused one just before middle; four interlocated hairs on posterior margin near apex. Fore tarsi with a small, acute tooth.

Abdomen slightly wider than pterothorax. Tube about .64 as long as head, just twice as long as basal width, and about twice as wide at base as at apex. Abdominal bristles pointed; terminal bristles nearly as long as tube.

Measurements of holotype: Length 1.61 mm.; head, length .226 mm., width .168 mm.; prothorax, length .138 mm., width (inclusive of coxæ)

.306 mm.; pterothorax, width .336 mm.; abdomen, width .372 mm.; tube, length .144 mm., width at base .072 mm., at apex .035 mm. Antennal segments: 1, 39 $\mu$ ; 2, length 54 $\mu$ , width 31 $\mu$ ; 3, length 60 $\mu$ , width 31 $\mu$ ; 4, length 60 $\mu$ , width 31 $\mu$ ; 5, 56 $\mu$ ; 6, 51 $\mu$ ; 7, 50 $\mu$ ; 8, 36 $\mu$ ; total length of antenna .406 mm.

Described from one female taken under a loose scale of the bark of a living white oak tree, near Baldwin, Michigan, August 23, 1908, by the writer.

The clouded wings and the structure of the antennæ are distinctive.

**Haplothrips faurei** sp. nov.

(Pl. 3, figs. 5 and 6.)

*Female*.—Length about 1.4 mm. Color dark blackish brown, with profuse maroon hypodermal pigmentation; antennal segments 3–6 lemon-yellow; fore tibiæ and fore tarsi yellow, the former shaded with blackish brown at base and along lateral surfaces; middle and hind tarsi light yellowish brown.

Head somewhat longer than wide, broadest a little behind middle; cheeks gently rounded, slightly convergent posteriorly; vertex slightly produced, the anterior ocellus overhanging; dorsal and lateral surfaces with a few, very weak, anastomosing lines, sparsely and briefly spinose; postocular bristles two-thirds as long as eyes, blunt. Eyes slightly more than one-third as long as head, very slightly, if at all, protruding. Ocelli anterior in position, the posterior pair opposite anterior third of eyes. Antennæ about 1.7 times as long as head, moderately slender; segment 3 conical, nearly symmetrical, twice as long as greatest width, distinctly narrower than, and subequal in length to, 2 and 4; 4 and 5 distinctly longer than wide, pedicellate, narrowed apically; 6 and 7 oblong, pedicellate, the former broader toward apex, the latter broader toward base; 8 slender, about three times as long as wide; sense cones and spines short and slender, segment 3 without cone on inner surface. Color of antennæ: Segments 1 and 2 dark blackish brown, the latter paler toward apex and at middle; 3–6 clear lemon-yellow, 6 more or less infuscate apically; 7 and 8 yellowish brown. Mouth cone normal to genus.

Prothorax about two-thirds as long as head and (inclusive of coxæ) about 2.3 times as wide as long, surface nearly smooth; anterior marginal bristles greatly reduced in size and barely visible; others blunt, the two pairs at the posterior angles longest. Wings distinctly narrowed at middle; fore wings with a slight brownish cloud at extreme base and with about 9 interlocated hairs on posterior margin near apex. Fore tarsi with a minute, acute tooth.

Abdomen slightly wider than pterothorax. Tube about .66 as long as head, twice as long as basal width, and twice as wide at base as at apex, suffused with hypodermal pigmentation. Abdominal bristles pointed; terminal bristles nearly equal in length to tube.

Measurements of holotype: Length 1.38 mm.; head, length .190 mm.,

width .184 mm.; prothorax, length .120 mm., width (inclusive of coxæ) .282 mm.; pterothorax, width .312 mm.; abdomen, width .336 mm.; tube, length .126 mm., width at base .060 mm., at apex .033 mm. Antennal segments: 1, 30 $\mu$ ; 2, 48 $\mu$ ; 3, length 51 $\mu$ , width 26 $\mu$ ; 4, length 52 $\mu$ , width 32 $\mu$ ; 5, 48 $\mu$ ; 6, 41 $\mu$ ; 7, 36 $\mu$ ; 8, 25 $\mu$ ; total length of antenna .331 mm.

Described from six females, bearing the following data: Ithaca, New York, Oct. 4, 1912, 2 females, "on ivy foliage," J. C. Faure; Florida, N. Y., Aug. 15, 1912, 4 females "on willow leaves, predaceous on mites," J. C. Faure.

*Type locality:* Ithaca, New York.

This distinct little species resembles *H. verbasci* (Osborn) at first sight, though the reduction of the anterior marginal bristles of the prothorax and the absence of the usual sense cone from the inner surface of the third antennal segment ally it more closely to *H. graminis* Hood. The form of the antennal segments, especially the third, and the coloration, are distinctive.

It is named for Mr. J. C. Faure, formerly an entomological student at Cornell University, whose interest in this order of insects has materially increased our American list.

#### **Haplothrips humilis** sp. nov.

(Pl. 4, figs. 1 and 2.)

*Female.*—Length about 1.3 mm. Color dark blackish brown; segments 3-6 of antennæ successively darker in color, 3 usually nearly clear yellow, 6 yellowish brown; fore tarsi yellow; fore tibiæ yellow apically.

Head about 1.1 times as long as wide; sides nearly parallel, very gently rounded, somewhat convergent posteriorly; vertex slightly produced, the anterior ocellus overhanging; dorsal and lateral surfaces sparsely and briefly spinose; postocular bristles about equal in length to eyes, pointed. Eyes slightly more than one-third as long as head, not protruding. Ocelli anterior in position, the posterior ocelli opposite anterior third of eyes. Antennæ about 1.5 times as long as head, moderately stout, form and structure well shown in figures (Pl. 4, figs. 1 and 2); segment 3 about 1.7 times as long as wide, asymmetrical, distinctly shorter than 2 and 4, narrower than the latter, without sense cone on inner surface. Color of antennæ: Segments 1 and 2 dark blackish brown, the latter paler toward apex and at middle; 3-6 successively darker in color, progressing from a nearly clear yellow to a light blackish brown; 7 and 8 darker blackish brown. Mouth cone normal to genus.

Prothorax about two-thirds as long as head and (inclusive of coxæ) nearly twice as wide as long, surface nearly smooth; anterior marginal bristles greatly reduced in size and barely visible; others blunt, the two pairs at the posterior angles nearly as long as postoculars, midlaterals and anterior marginals two-thirds as long. Wings distinctly narrowed at middle; fore wings with a slight brownish cloud at extreme base and with about 8 interlocated hairs on posterior margin near apex. Fore tarsi with a distinct acute tooth.



Abdomen slightly wider than pterothorax. Tube about half as long as head, less than twice as long as basal width, and nearly twice as wide at base as at apex. Abdominal bristles pointed; terminal bristles about one-fourth longer than tube.

Measurements of holotype: Length 1.26 mm.; head, length .210 mm., width .180 mm.; prothorax, length .144 mm., width (inclusive of coxæ) .280 mm.; pterothorax, width .318 mm.; abdomen, width .360 mm.; tube, length .108 mm., width at base .060 mm., at apex .033 mm. Antennal segments: 1,  $36\mu$ ; 2, length  $48\mu$ , width  $28\mu$ ; 3, length  $41\mu$ , width  $24\mu$ ; 4, length  $47\mu$ , width  $30\mu$ ; 5,  $45\mu$ ; 6,  $41\mu$ ; 7,  $41\mu$ ; 8,  $30\mu$ ; total length .329 mm.

Described from five females taken by sweeping on "Moro Island, Panama (near Taboga Island, Bay of Panama), October 17, 1913," by Mr. James Zetek.

The form and size of the third antennal segment and the absence of the usual sense cone from its inner surface, together with the character of the prothoracic bristles and the unusually short tube, would seem to indicate a very distinct species.

#### **Glyptothrips flavescens** Hood.

1912. *Pactothrips* [lapsus, *Glyptothrips*] *flavescens* Hood, Psyche, vol. XIX, p. 116, Pl. 9, figs. a-c.

Seven apterous females and four apterous males of this anomalous Phlæothripid were taken in grass sod at Chester, New York, April 2, 1913, by Mr. J. C. Faure. The species was known previously from three macropterous females, collected in Illinois. Except for the absence of ocelli and wings and the consequent reduction in the size of the pterothorax, the specimens agree closely with the types. The males differ in being smaller and slightly more slender.

#### **Rhynchothrips tridentatus** (Shull).

(Plate 4, figs. 4 and 5.)

1909. *Trichothrips tridentatus* Shull, Ent. News, vol. XX, p. 226, fig. 6.

1912. [*Rhynchothrips*] *tridentatus* Hood, Proc. Ent. Soc. Wash., vol. XIV, p. 141.

Both this species and Moulton's *Trichothrips ilex* are described as having all tarsi armed with a tooth. The term "tarsal tooth," however, since the time of Uzel's epoch-making work, has been taken to mean a chitinous evagination of the inner surface of the tarsus near its base; while the structures seen by Shull and Moulton are the *articulated claws* at the *apex* of the tarsus,—almost certainly present in every species of the order Thysanoptera. Teneral specimens often show these claws very clearly, and this is the explanation for the prominence which Shull gives the character in his description, for both of his types are freshly emerged specimens.

In 1895 Uzel described the mechanism of the tarsal claws on pages 304 and 305 of his "Monographie," and figured the tarsus of the larva of *Trichothrips copiosus* on Tab. VIII, figs. 152-155. One of his more pertinent sentences, freely translated from the Bohemian, is as follows: "On the extremity, the tarsus of the fringe-wings has two movable claws which are strongly united to the dilation of the integument which is found between them." It will thus be noticed that the presence of such claws is an ordinal character instead of a specific one.

The antenna, also, of *tridentatus* is misleadingly described and figured by Shull, because observed in lateral aspect. The true form of the distal segments and the structure of the head and prothorax are shown in the figures given herewith.

The species is common on various oaks, and has been examined by the writer from the following localities: Anna, Illinois, June 27, 1909, C. A. Hart; Boskydell, Ill., Oct. 21-23, 1908, L. M. Smith; Carbondale, Ill., Oct. 15, 16, 1908, L. M. Smith; Farrington, Ill., April 10, 1909, H. E. Ewing; Marshall, Ill., Oct. 3, 1908, H. E. Ewing; Mounds, Ill., Aug. 9, 1909, J. D. Hood; Murphysboro, Ill., Nov. 6, 1908, L. M. Smith; Pulaski, Ill., Oct. 27, 1908, L. M. Smith, and May 29, 1909, C. A. Hart; Urbana, Ill., Nov. 15, 1907, R. D. Glasgow, Jan. 29, 1908, J. D. Hood and H. E. Ewing, June 9, 1909, C. A. Hart and F. D. Shobe; Baldwin, Michigan, Aug. 15, 23, and 31, 1908, J. D. Hood; Wittenberg, Missouri, July 12, 1909, C. A. Hart; Plummer's Island, Maryland (near Washington, D. C.), April 6, 1913, J. D. H.; Cabin John, Md., June 8, 1913; Washington, D. C., June, 1913, J. R. Malloch and J. D. H., reared.

#### ***Liothrips caryæ* (Fitch).**

(Plate 4, fig. 6.)

1856. *Phleothrips caryæ* Fitch, Third Rept. Nox. Ins. State N. Y., in Ann. Rept. N. Y. State Agr. Soc., vol. XVI, p. 445.

This species, though occasionally referred to since its original description, has virtually been lost to science for nearly sixty years. In Illinois and Maryland I have found it commonly in May and June on the leaves of hickory and in old, dried, phylloxera galls. The thrips are certainly not concerned in the making of the galls, and probably frequent them only to secure protection during metamorphosis.

Fitch's description, now out of print and very rare, is as follows:

165. HICKORY THRIPS, *Phleothrips Caryæ*, new species. (Homoptera. Thripididæ.)

Slender conical protuberances like the spur of a cock a quarter of an inch long, standing out perpendicularly from the under surface of the leaf and closed at their end, with a similar protuberance upon the opposite side of the leaf having its end open and split into several long slender teeth; within these galls a small slender shining black insect with the middle joints of its antennæ honey-yellow and its long narrow white wings appressed to its back.

Whether these singular galls, which resemble a long slender pod thrust half way through the leaf, are produced by the Thrips found in them, or by some other insect which forsakes them before this takes up its abode

there, I am unable to say. In the instance in which I noticed them particularly, they occurred upon a young shag-bark hickory in the month of September. Quite a number of the leaves had one and several had two or more galls growing upon them, in each one of which was one or more of these insects or their larvæ. The galls were of a very tough leathery texture, green where they adjoined the leaf and deep purple at their ends, though most of them at that date had become dry and faded to a dark brown color. The leaf is often wrinkled around the gall and has more or less of a fold extending from thence to its outer edge. The insect within, when disturbed, turns its tail upward over its back in a menacing manner, the same as the rove beetles (*Staphylinidæ*) do; and when the point of a needle which has been pressed upon one of these insects is touched to the tip of the tongue, unless my imagination greatly deceives me, it will frequently be found to impart a peculiar acrid biting sensation. This insect is 0.07 long, of a deep black color and highly polished. Its head is narrower than the thorax and nearly square. The third, fourth and fifth joints of the antennæ are longer than the others, yellow and slightly transparent; the last joint is shortest and but half as thick as those which precede it. The abdomen is egg-shaped with its tip drawn out into a tube thrice as long as it is thick, with four long bristles at its end, and the abdomen is furnished with bristles at each of its sutures. The wings do not reach the tip of the abdomen. They are white and slightly transparent and fringed with black hairs. In its larva state it has a more slender linear form with a dull greenish yellow head, a white thorax with a broad black band anteriorly, a pale red abdomen with a black band at its tip, and whitish legs.

The description quoted above of the adult insect is not sufficiently detailed to distinguish it readily from the many other species of the genus which have been diagnosed in recent years. The following should enable it easily to be recognized:

*Female*.—Length about 2.0 mm. Color dark blackish brown or black; tarsi and articulations of legs paler; antennal segments 3–6 largely yellow in basal portions.

Head about 1.14 times as long as wide, broadest just behind eyes; cheeks gently arched, slightly convergent posteriorly; vertex truncate, not at all produced, abruptly declivous, the anterior ocellus distinctly overhanging; dorsal and lateral surfaces deeply and closely roughened with transverse lines and set with several short spines; postocular bristles pointed, about as long as eyes. Eyes about one-third as long as head, not protruding. Posterior ocelli opposite line drawn behind anterior third of eyes. Antennæ twice as long as head, form and structure well shown in figure (Pl. 4, fig. 6); sense cones small; formula: 3, 0-1; 4, 1-2+<sup>1</sup>; 5, 1-1+<sup>1</sup>; 6, 1-1+<sup>1</sup>; 7 with 1 on dorsum near apex. Color of antennæ: Segments 1 and 2 nearly concolorous with head, 2 yellowish apically; 3 nearly clear yellow, usually infuscate in apical third; 4-6 yellowish, successively darker in color, irregularly marbled with brown apically; 6-8 uniform blackish brown or with pedicel of 7 paler. Mouth cone subacute, nearly attaining base of prosternum.

Prothorax about .6 as long as head and (inclusive of coxæ) nearly 2.5 times as wide as long; all bristles present, pointed, unusually long for the genus, the two pairs at the posterior angles nearly as long as prothorax; other bristles about half as long; coxal bristle pointed, sill

shorter. Pterothorax wider than prothorax and longer than wide; sides slightly areolate, converging posteriorly. Wings long, closely fringed, slightly broadened apically; fore wings lightly shaded with brownish yellow at base, remainder clear white; posterior margin with about 20 interlocated hairs. Fore tarsi unarmed.

Abdomen large and heavy, wider than pterothorax. Tube .9 as long as head and nearly three times as long as basal width, which is about twice the apical. Abdominal bristles moderately long, yellow (or brown) in color, pointed; terminal bristles brown, about four-fifths as long as tube.

Measurements of neoholotype: Length 2.00 mm.; head, length .268 mm., width .235 mm.; prothorax, length .468 mm., width (inclusive of coxæ) .415 mm.; pterothorax, width .456 mm.; abdomen, width .528 mm.; tube, length .246 mm., width at base .087 mm., at apex .041 mm. Antennal segments: 1,  $54\mu$ ; 2,  $69\mu$ ; 3, length  $84\mu$ , width  $36\mu$ ; 4, length  $78\mu$ , width  $40\mu$ ; 5,  $74\mu$ ; 6,  $72\mu$ ; 7,  $66\mu$ ; 8,  $42\mu$ ; total length of antenna .54 mm.

*Male*.—Length about 1.8 mm. Slightly smaller and more slender than female, otherwise almost identical.

Redescribed from many specimens of both sexes as follows: Carbondale, Illinois, June 27–29, 1907, J. D. Hood, both sexes reared abundantly from pupæ taken in phylloxera galls on hickory leaves; Hillery, Ill., June 10, 1908, C. A. Hart, both sexes common on hickory leaves; Mt. Carmel, Ill., May, 1884, in phylloxera galls on hickory leaves (Acc. No. 2358, Ill. State Lab. Nat. Hist.); Pulaski, Ill., May 21, 1907, C. A. Hart, 1 male swept from grass and weeds; Plummer's Island, Maryland, June 8 and 29, 1913, J. D. H., on hickory leaves, and reared from pupæ in phylloxera galls on hickory leaves.

The large size, truncate vertex, long, pointed bristles, and the long tube are the principal diagnostic characters.

I have designated the above specimens as the "neotypes" of the species, Fitch's original types having been lost.

#### ***Leptothrips mali* (Fitch).**

1855. *Phlæothrips Mali* Fitch, First Rept. Nox. Ins. State N. Y., p. 102; also in Trans. N. Y. State Agr. Soc., vol. IV, for 1854, p. 806.
1902. *Cryptothrips aspersus* Hinds, Proc. U. S. Nat. Mus., vol. XXVI, p. 205, Pl. X, figs. 104–106.
1904. *Cryptothrips californicus* Daniel, Ent. News, vol. XV, p. 293.
1907. *Cryptothrips californicus* Moulton, Tech. Ser. 12, Pt. III, Bur. Ent., U. S. Dept. Agr., p. 66.
1908. *Cryptothrips aspersus* Franklin, Proc. U. S. Nat. Mus., vol. XXXIII, p. 727.
1908. *P[hyllothrips] aspersus* Hood, Can. Ent., vol. XL, p. 305.
1909. *Phyllothrips aspersus* Hood, Ent. News, vol. XX, p. 32, fig. 4.
1909. *Leptothrips aspersus* Hood, Ent. News, vol. XX, p. 249.
1909. *Leptothrips aspersus* Crawford, Pomona Coll. Journ. Ent., vol. I, p. 121.

1910. *Liothrips mcconnelli* Crawford, Pomona Coll. Journ. Ent., vol. II, p. 163, fig. 68, A-G.
1911. *Cryptothrips californicus* Moulton, Tech. Ser. 21, Bur. Ent., U. S. Dept. Agr., p. 32, Pl. VI, figs. 45, 46.
1911. *Leptothrips aspersus* Idem, ibidem.
1911. *Liothrips mcconnelli* Idem, ibidem, p. 33.
1911. *Phyllothrips aspersus* Shull, Pub. 4, Mich. Geol. and Biol. Surv., p. 213.
1912. *Leptothrips aspersus* Back, Ent. News, vol. XXIII, p. 73.
1912. *Leptothrips aspersus* Hood, Proc. Biol. Soc. Wash., vol. XXV, p. 62.
1913. *Leptothrips aspersus* Hood, Psyche, vol. XX, p. 121.
1913. *Leptothrips aspersus macro-ocellatus* Watson, Ent. News, vol. XXIV, p. 148.
1913. *Leptothrips aspersus* Morgan, Proc. U. S. Nat. Mus., vol. 46, pp. 38, 46.

A study of Fitch's description of *Phlæothrips mali* has convinced the writer that *Leptothrips aspersus* (Hinds), with its several synonyms, is identical therewith. The description is of a blackish purple Phlæothripid on apple, 1.5 mm. in length and only one-sixth as broad, with the third antennal segment white, and the head longer than wide. *Leptothrips aspersus* agrees perfectly with *mali* in these several particulars, and, furthermore, is the only known member of its suborder in the United States which could possibly be described as "blackish purple" in color. It is very common on apple leaves in Illinois, and is the only external feeder which I have ever seen on that tree.

The type of *Phlæothrips mali* has evidently been lost, and Doctor Hinds' type of *Cryptothrips aspersus* may properly be considered the neoholotype.

Doctor Fitch's account of this insect is no doubt inaccessible to most Thysanopterists and so is reproduced below:

In the month of August several apples were noticed upon the trees, which were small, withered, and ready to fall, yet without any of those worms in them which occasion the destruction of so much fruit at this season of the year. On searching for the cause of this withering of these apples we found a small cavity or little hollow at the tip end, commonly close beside the relics of the flower. This cavity had the appearance of having been gnawed; it was about the size of a pea, and its surface of a black color. Several of these cavities were occupied by a minute slender insect; and from appearances I inferred that the young of these insects had taken up their residence upon the apples whilst they were quite small, and by wounding them slightly day after day, had retarded their growth and finally caused them to wither. It is possible that some other insect had originally produced these wounds, and that these which were now there had been attracted to the wounds to suck their juices; but every appearance indicated that these were the real culprits. . . . This which occurs in wounded spots upon young apples, appears to pertain to the genus named *Phlæothrips* by Mr. Haliday, and I propose for it the specific name *Mali*, or the Apple Thrips.

This insect measures only six-hundredths of an inch in length and one-

hundredth in width. It is polished and shining, and of a blackish purple color. Its antennæ which are rather longer than the head and composed of eight nearly equal joints, have the third joint of a white color. The abdomen is concave on its upper side, and is furnished with a conical tube at its tip which has a few bristles projecting from its apex. The wings when folded are linear, silvery white, and as long as the abdomen; they are pressed closely upon the back, spreading asunder at their bases, and appear like an elongated white Y-shaped mark. Viewed from above, the head is of a square form, longer than wide. The first segment of the thorax is well separated from the second, is broadest at its base, and gradually tapers to its anterior end, where it is as wide as the head. The following segment is the broadest part of the body and square, with its length and breadth equal.

**Acanthothrips albivittatus** Hood.

1908. *Acanthothrips albivittatus* Hood, Bull. Ill. State Lab. Nat. Hist., vol. VIII, art. II. p. 374.  
 1912. *H[oplothrips, lapsus] albivittatus* Hood, Can. Ent., vol. XLIV, p. 143, footnote.

Since its description in 1908 from one female taken at Bloomington, Illinois, this species has come to hand from the following localities: Carbondale, Illinois, October 16, 1908, L. M. Smith, 1 female from branch of oak; Makanda, Ill., Sept. 25, 1908, L. M. Smith, 1 female "found on wrist while examining apple leaves"; Washington, D. C., June 15-21, 1913, J. R. Malloch and J. D. Hood, 3 females and 2 males reared from nymphs taken June 10 on trunk of dying red oak tree.

The male differs from the female in so few particulars that an additional description of that sex is unnecessary. The black antennæ and white dorso-lateral stripes are distinctive.

Genus **Dichætothrips** nov.

(δύο, two; χείρη, bristle; θρίψ, a wood worm.)

Head subrectangular, much longer than broad, more than twice as long as median dorsal length of pronotum; vertex not produced; cheeks smooth, sparsely spinose; postocular bristles long, pointed; postocellar bristles exceedingly long, nearly as prominent as the postoculars. Antennæ eight-segmented; segments 4-6 without ventral prolongations at apex; segment 4 longest. Eyes small, about one-fourth as long as head. Anterior ocellus directed forward. Mouth cone not as long as wide, semicircular at apex, slightly surpassing middle of prosternum. Prothorax more than three times as wide across coxæ as median length of dorsum; posterior margin nearly straight; anterior margin almost semicircularly emarginate, conspicuously thickened; anterior marginal and anterior angular bristles minute, others well developed. Fore tarsi strongly armed. Wings broad, slightly expanded apically. Abdomen broad and heavy; tube large and stout, about as long as head.

*Type: Dichætothrips brevicollis* sp. nov.

The close relationship existing between this genus and *Diceratothrips* Bagnall is partly responsible for the similarity of the two names. In each

of these genera one pair of cephalic bristles, ordinarily minute and inconspicuous, is remarkably produced and thickened. In *Dichætothrips* this pair is the postocellar one; while in *Diceratothrips* it is a pair on the vertex, laterad of the median ocellus. The short, broadly rounded mouth cone, the stout tube, and the short, broad, semicircularly emarginate prothorax with its thickened anterior margin, are also distinctive. This last character seems to be unique, all other genera having this margin very weak, sometimes grading insensibly, or even irregularly, into the granulate membrane connecting the thorax with the head. Mr. Bagnall, after a study of the single specimen from which the genus is described, expressed himself as agreeing with the above interpretation of its affinities.

***Dichætothrips brevicollis* sp. nov.**

(Plate 4, fig. 7.)

*Female*.—Length about 3.7 mm. Surface shining. Color nearly uniform piceous black, with tarsi and fore tibiæ yellowish.

Head subrectangular, 1.63 times as long as wide; vertex not produced, evenly declivous; frontal costa deeply and roundly emarginate; cheeks nearly parallel, very slightly converging to a short, abrupt, collar-like, basal widening; dorsal and lateral surfaces smooth, with about three pairs of short lateral spines, of which one (the largest) is on a line with the postocular bristles, the other two in basal third; postocular bristles pointed, two-thirds as long as head; postocellar bristles nearly as prominent as the postoculars, almost half as long as head. Eyes slightly less than one-fourth as long as head, subrectangular in form. Ocelli moderately large, their diameter about three times as great as that of facets of eyes; anterior ocellus apparently slightly overhanging, pointing directly forward; posterior ocelli widely separated, nearly contiguous to margins of eyes at a line drawn through middle of anterior half. Antennæ about 2.1 times as long as head; segments 3–7 claviform, elongate, 3–5 inflated in apical third, 4 and 5 both longer than 3; 8 nearly fusiform; sense cones long, slender, those on segment 3 nearly five-sixths as long as the segment itself. Color of antennæ: Nearly black, with base of segment 1, apex of 2, and base of 3, yellowish.

Prothorax along median dorsal line about one-third as long as head and (inclusive of coxæ) about 3.8 times as wide as long; posterior margin and sides nearly straight; anterior margin almost semicircularly emarginate, conspicuously thickened; anterior marginal and anterior angular bristles minute, about equal in size to those on cheeks; midlaterals about equal in length to postocellars, posterior marginals half as long (posterior angulars and coxals broken off in the unique type). Pterothorax slightly wider than prothorax, sides slightly arcuate and convergent posteriorly. Wings long and broad, closely fringed; fore wings slightly expanded apically and with about 35 interlocated hairs on posterior margin near apex; both pairs clouded with brown, more darkly at base, and with a post-median dark brown vitta. Fore femora about three times as long as wide, almost equal in length to head; fore tarsi with a stout and slightly curved tooth which is about as long as width of tarsus.

Abdomen slightly wider than pterothorax. Tube equal in length to head and 2.5 times as long as basal width, which is three times the apical; sides straight. Abdominal bristles pointed, those on segment 9 longer than tube; terminal bristles about half as long as tube.

Measurements of holotype: Length 3.65 mm.; head, length .540 mm., width .331 mm.; prothorax, length along median dorsal line .186 mm., width (inclusive of coxæ) .708 mm.; pterothorax, width .732 mm.; abdomen, width .804 mm.; tube, length .540 mm., width at base .216 mm., at apex .070 mm. Antennal segments; 1, 111 $\mu$ ; 2, 99 $\mu$ ; 3, length 165 $\mu$ , width 60 $\mu$ ; 4, length 204 $\mu$ , width 66 $\mu$ ; 5, 201 $\mu$ ; 6, 153 $\mu$ ; 7, 100 $\mu$ ; 8, 94 $\mu$ ; total length of antenna 1.13 mm.

Described from one female taken at Rockstone, British Guiana, February 28, 1913, by Mr. G. E. Bodkin, Government Economic Biologist.

***Diceratothrips picticornis* sp. nov.**

(Plate 5, figs. 1 and 2.)

*Female* (macropterous).—Length about 3.1 mm. Color nearly piceous black, with knees, bases of femora, and first three antennal segments, yellow.

Head subrectangular, 1.28 times as long as wide, truncate in front; cheeks nearly parallel, very slightly areolate, equally converging to eyes and to an abrupt collar-like basal widening about one-fourth as long as eye; dorsal and lateral surfaces with faint anastomosing lines, sparsely spinose, a pair of stouter spines at basal and apical thirds, respectively; postocular bristles pointed, about 1.6 times as long as eyes; a pair of prominent, stout bristles on front near eyes, half as long as postoculars. Eyes about one-fourth as long as head; inner margins nearly straight, subparallel, forming a broadly rounded acute angle with the posterior margins. Ocelli moderately large, their diameter about twice as great as that of facets of eyes; anterior ocellus situated on extreme vertex, slightly overhanging and pointing directly forward; posterior ocelli widely separated, nearly contiguous to margins of eyes. Antennæ inserted beneath vertex, 2.1 times as long as head; segments 3–5 claviform, elongate, 3 more than four times as long as its greatest subapical width; 6 and 7 oblong, pedicellate; 8 subconical; sense cones and bristles short. Color of antennæ: Segments 1–3 yellow, 1 slightly clouded at base with brown, 3 dark brown in apical seventh; 4–8 dark blackish brown, 4 paler in basal three-fourths. Mouth cone broadly rounded at apex, reaching well beyond middle of prosternum.

Prothorax along median dorsal line about .56 as long as head and (inclusive of coxæ) about 2.6 times as wide as long, sides nearly straight, surface nearly smooth; anterior angles not at all produced; usual spines all present, the pair at the posterior angles longest, slightly longer than postoculars; posterior marginals and coxals subequal in length, half as long as postoculars; other bristles minute, about as long as those on cheeks. Pterothorax slightly wider than prothorax, sides slightly areolate and convergent posteriorly. Wings long and broad, closely fringed,



clouded with brown, more darkly toward base; fore wings with about 35 interlocated hairs on posterior margin near apex. Legs shorter and stouter than usual in the genus; fore femora about 1.8 times as long as wide and slightly more than .8 as long as head, with two short, stout spines on inner surface near base; fore tarsi armed with a short and rather blunt tooth.

Abdomen slightly wider than pterothorax. Tube slightly longer than head and about 3.4 times as long as subbasal width, which is 2.3 times the apical; sides nearly straight, very slightly expanded basally, somewhat constricted apically. Abdominal bristles pointed, black at base, those on segment 9 equal in length to tube.

Measurements of holotype: Length 3.06 mm.; head, length .414 mm., width .324 mm.; prothorax, length along median dorsal line .228 mm., width (inclusive of coxæ) .588 mm.; pterothorax, width .636 mm.; abdomen, width .684 mm.; tube, length .456 mm., width at base .135 mm., at apex .059 mm. Antennal segments: 1, 70 $\mu$ ; 2, 93 $\mu$ ; 3, length 205 $\mu$ , width 46 $\mu$ ; 4, 149 $\mu$ ; 5, 124 $\mu$ ; 6, 102 $\mu$ ; 7, 84 $\mu$ ; 8, 56 $\mu$ ; total length of antenna .88 mm.

*Male* (macropterous).—Very similar to female in structure, and of about the same size though slenderer.

Head about 1.58 times as long as greatest width; cheeks distinctly converging from eyes to basal fourth, thence subparallel.

Prothorax along median dorsal line about .7 as long as head and (inclusive of coxæ) nearly twice as wide as long, sides broadly rounded. Fore femora enlarged and swollen, 1.2 times as long as head and 1.8 times as long as wide, armed on inner surface with two stout teeth and several bristles (see Plate 5, fig. 2); apex of fore femora yellow; fore tibiae yellow along middle.

Abdomen more slender than that of female; tube slightly shorter than head.

Described from one female and one male, taken in a moving train, Canal Zone, Panama, by Mr. James Zetek.

The antennal coloration will distinguish this species readily from its described congeners. The teeth on the inner surface of the fore femora of the male indicate a close relationship to *D. armatus* Bagnall, with which it has been compared by both Mr. Bagnall and myself.

### ***Polyphemothrips corticis* sp. nov.**

(Plate 5, fig. 3.)

*Female*.—Length about 4.1 mm.; width of pterothorax .65 mm. Color blackish brown, with almost solid crimson hypodermal pigmentation, the abdomen appearing bright red to the naked eye; antennal segments 4–7 and basal portion of tube, black; segment 3 of antenna pale yellowish in basal two-thirds.

Head about 1.6 times as long as width at base, prominently elevated along anterior portion of median line; vertex elevated and produced, overhanging bases of antennae; cheeks abruptly swollen on ventral lateral

margin just behind eyes, thence gently converging to basal three-tenths, and widening again to base, the relative widths of the head at these points being in the relation of 34:31:37; lateral surfaces faintly subreticulate, sparsely spinose; postocular bristles pointed, about one-half longer than eyes. Eyes about one-fifth as long as head, abruptly protruding, lateral margins flattened posteriorly. Ocelli moderately large, closely approximate; anterior ocellus situated on extreme vertex, directed forward; *posterior ocelli distinctly in front of anterior margin of eyes.* Antennæ inserted on ventral surface, seven-segmented, 1.8 times as long as head; segments 1 and 2 shortest, subequal in length; 3-6 claviform, 4 slightly longer than 3; 7 fusiform, slightly longer than 6, with a faint suture on ventral surface at apical fifth. Color of antennæ: Segments 1 and 2 blackish brown; 3 brownish white, slightly darkened basally, apical third dark brown-black; 4-7 *nearly opaque black*, slightly brownish *apically.* Sense cones long, slender; formula: 3, 1-2; 4, 2-2; 5, 1-1+<sup>1</sup>; 6, 1-1+<sup>1</sup>; 7 with one on dorsum at apical three-fourths. Mouth cone very blunt, broadly rounded, *nearly attaining mesosternum.*

Prothorax along median dorsal line about .35 as long as head and (inclusive of coxæ) about three times as wide as long; all usual bristles present, pointed; posterior marginals longest, about equal in length to postoculars; posterior angulars two-thirds as long; other bristles subequal, about one-third as long as posterior marginals. Pterothorax slightly narrower than prothorax, sides nearly parallel. Wings long, closely fringed, about 11 times as long as broad; fore wings clouded with brown, darker basally, with three more or less distinct longitudinal bands in basal two-thirds; posterior margin with about 44 interlocated hairs near apex. Legs slender; fore femora about as long as basal width of head and slightly more than one-third as wide as long; fore tarsi with a stout tooth, the apex of which is directed forward.

Abdomen (collapsed in the two types of this sex) probably about as wide as prothorax. *Tube .54 as long as head* and about 2.4 times as long as width at base, *basal width about 2.25 times the apical*; sides nearly straight. Abdominal bristles long, pointed, brown at base, those on segment 9 longer than tube; terminal bristles three-fourths as long as tube.

Measurements of holotype: Length 4.1 mm.; head, length .714 mm., width behind eyes .408 mm., behind middle .377 mm., at base .444 mm.; prothorax, length along median dorsal line .252 mm., width (inclusive of coxæ) .737 mm.; pterothorax, width .648 mm.; tube, length .384 mm., width at base .162 mm., at apex .072 mm. Antennal segments: 1, 108 $\mu$ ; 2, 111 $\mu$ ; 3, length 198 $\mu$ , width 63 $\mu$ ; 4, 203 $\mu$ ; 5, 179 $\mu$ ; 6, 135 $\mu$ ; 7, 146 $\mu$ ; total length of antenna 1.08 mm.

*Male.*—(Plate 5, fig. 3.) Very much like female in color and general structure, but more slender.

Head of same form as in female; posterior ocelli on a line with anterior margins of eyes. Prothorax about .48 as long as head and (inclusive of coxæ) about 2.8 times as wide as long; median dorsal line with dark chitinous thickening. Fore femora nearly as long as head and about half

as broad as basal width of head; fore tarsi with a stout tooth about three-fifths as long as width of tarsus, arising at a right angle.

Measurements of allotype: Length 3.62 mm.; head, length .600 mm., width behind eyes .372 mm., behind middle .312 mm., at base .352 mm.; prothorax, length .288 mm., width (inclusive of coxæ) .756 mm.; pterothorax, width .696 mm.; abdomen, width .660 mm.; tube, length .360 mm., width at base .149 mm., at apex .065 mm. Antennal segments: 1, 108 $\mu$ ; 2, 99 $\mu$ ; 3, length 183 $\mu$ , width 60 $\mu$ ; 4, 186 $\mu$ ; 5, 162 $\mu$ ; 6, 123 $\mu$ ; 7, 138 $\mu$ ; total length of antenna 1.00 mm.

*Nymph* (probably in last instar).—Length about 3.8 mm. Color bright red, with antennæ, vertex, legs, and abdominal segments 1, 2, and 7, yellowish white; tube dark brown, nearly black at apex.

Described from two females, six males, and three nymphs, taken at Ancón, Canal Zone, Panama, November 4, 1913, by Mr. James Zetek. They were found on the branches and under the bark of a fallen dead tree, in company with a Tenebrionid beetle, *Doliema angustata* Champion.

This species agrees very well with the description of *P. brasiliensis*, except for the italicized portions of the above description, and the smaller size. *Brasiliensis* is said to be described from the male, though the drawing clearly shows the specimen to be a female.

### **Cryptothrips gilvipes** sp. nov.

(Plate 5, fig. 4.)

*Female* (forma aptera).—Length about 2.6 mm. Color black, with first two antennal segments, legs, prothorax, mesothorax, and sides of metathorax orange-yellow; head brown; hypodermal pigmentation lemon-yellow.

Head 1.2 times as long as wide, narrowed posteriorly, and at base with neck-like constriction; lateral and dorsal surfaces without sculpture, sparsely and briefly spinose; vertex rounded and evenly declivous; post-ocular bristles one-third longer than dorsal length of eyes, pointed. Eyes flattened, protruding, produced posteriorly on ventral surface of head, widely separated, their dorsal interval a little greater than the ventral length. Ocelli minute, the posterior pair widely separated. Antennæ about 1.8 times as long as head, form and structure well shown in figure (Pl. 5, fig. 4). Color of antennæ: Segments 1 and 2 yellow, the latter shaded with brown along inner surface and at base; 3 with pedicel dark orange-yellow and apical region yellowish brown, intervening portion nearly black; 4-6 very dark blackish brown, irregularly paler near middle; 7 and 8 nearly coal black; sense cones and bristles short, slender, segment 3 with one sense cone on outer surface. Mouth cone less than half as long as face and about as long as wide; tip of labrum not attaining tip of labium, the interval about equal in length to second segment of maxillary palpus.

Prothorax two-thirds as long as head and (inclusive of coxæ) about 1.9 times as wide as long, with faint median thickening; posterior angular bristles nearly as long as postoculars; coxal bristle one-third as long; all

other bristles minute and barely visible. Pterothorax slightly wider than prothorax, sides subparallel. Legs nearly uniform orange-yellow, except for a narrow wash of brown along outer surfaces of hind femora; fore tarsus unarmed.

Abdomen stout, heavy, about 1.4 times as broad as pterothorax. Tube three-fourths as long as head, slightly more than twice as wide at base as at apex, sides almost straight; abdominal bristles pointed, light brown; terminal bristles as long as tube.

Measurements of holotype: Length 2.59 mm.; head, length .348 mm., width .288 mm.; prothorax, length .288 mm., width (inclusive of coxæ) .438 mm.; pterothorax, width .480 mm.; abdomen, width .684 mm.; tube, length .264 mm., width at base .131 mm., width at apex .056 mm. Antennal segments: 1, about 75 $\mu$ ; 2, about 75 $\mu$ ; 3, 111 $\mu$ ; 4, length 102 $\mu$ , width 42 $\mu$ ; 5, 96 $\mu$ ; 6, 75 $\mu$ ; 7, 58 $\mu$ ; 8, 50 $\mu$ ; total length of antenna .64 mm.

Described from one female taken by sweeping, at Plum Point, Maryland, August 9, 1913, by W. L. McAtee.

This is an easily recognized species, allied to *C. dentipes* (Reuter) and *C. bicolor* (Heeger). The short tube and the color of the legs and prothorax separate it readily from *dentipes*, while the coloration of the antennæ and the absence of a sense-cone on the inner surface of the third antennal segment should serve to distinguish it from *bicolor*.

#### **Cryptothrips bicolor** (Heeger).

1852. *Phlaothrips bicolor* Heeger, Sitzungsber. d. Akad. d. Wiss., Wien, IX, p. 477, tab. XVIII.

1889. *Phlaothrips bicolor* Uzel, Vesmír, ročník XVIII, str. 259.

1895. *Cryptothrips bicolor* Uzel, Monogr. d. Ordn. Thys., p. 235.

This species appears to have been recorded only from Austria, where it was taken at Vienna as early as 1808, and in Bohemia, by Uzel, at a later date. Mr. J. C. Faure collected two females and one male of a *Cryptothrips* which agrees exactly with Uzel's description of *bicolor*, at Canastota, New York, March 12, 1913, from grass. It has been impossible to compare these specimens with European ones, because of the rarity of the species, but the identification is almost certainly correct.

#### **Megalothrips spinosus** Hood.

1908. *Megalothrips* (?) *spinosus* Hood, Can. Ent., vol. XL, p. 306, figs. 16, 17.

1909. *Megalothrips* (?) *spinosus* Franklin, Ent. News, vol. XX, p. 231.

1910. *I[dolothrips]* *spinosus* Crawford, Pomona Coll. Journ. Ent., vol. II, p. 170.

Specimens of this large thrips have been examined by the writer from the following localities: Harrisburg, Pennsylvania (type locality), March 10, 3 females, "in burrows of Lepidopterous or Coleopterous larva in dead willow stem"; Rockville, Pa., November 10, 1912, A. B. Champlain, 23 females and 2 males, "from Cerambycid burrow in oak";

Nyack, New York, 1884, J. L. Zabriskie, 1 female, "ex. nest of *Ceratina dupla* Say" (coll. U. S. National Museum); Ithaca, N. Y., March 24, 1905, Miss Fletcher, 2 females, "from hole in dead twig" (from coll. J. C. Faure); Plummer's Island, Maryland (near Washington, D. C.), June 8–October 12, W. L. McAtee and J. D. Hood, both sexes and many nymphs from dead leaves in fork of willow tree, and from dead willow branch; Vienna, Virginia, April 7 and 19, 1913, R. A. Cushman, 2 females, in old galls of *Gnorimoschema gallusolidaginis* on golden rod; Carbondale, Illinois, July 30, 1909, L. M. Smith, 1 female, "in jar in which twig-girdlers (*Oncideres cingulata* Say) were being bred from persimmon twigs"; Muncie, Illinois, July 24, 1909, J. D. Hood, 1 female, in burrow in dead willow stem, with numerous eggs and young nymphs; St. Paul, Minnesota, September 19, 1908, H. J. Franklin, 2 females, from dead limb of white birch (1 female now in writer's collection).

In the original description this species was placed with doubt in the genus *Megalothrips* Uzel and the statement made that the generic position must remain uncertain until the discovery of the male. Two years later Mr. D. L. Crawford remarked parenthetically that the species is "really an *Idolothrips*" and prophesied that "the males of *I. spinosus* will be found to have a large tarsal tooth." It was thus of great interest to me to note the prominent projections on the sixth abdominal segment of the males recorded above, nearly as shown by Uzel in his figure of *Megalothrips bonannii*, which make certain the reference of this species to *Megalothrips*.

#### EXPLANATION OF PLATES.

The minor bristles and spines have usually been omitted in the figures on the following three plates, because of their unimportance in the differentiation of species and the impossibility of observing them except in specially prepared mounts.

#### PLATE III.

- Fig. 1. *Trichothrips karnyi major* subsp. nov. Head and prothorax, female (holotype).
2. *Trichothrips zonatus* sp. nov. Head and prothorax, female (holotype).
3. *Haplothrips nubilipennis* sp. nov. Head and prothorax, female (holotype).
4. *Haplothrips nubilipennis*. Segment 3 of left antenna, female (holotype).
5. *Haplothrips faurei* sp. nov. Segment 3 of left antenna, female (holotype).
6. *Haplothrips faurei*. Head and prothorax, female (holotype).

PLATE IV.

- Fig. 1. *Haplothrips humilis* sp. nov. Head and prothorax, female (holotype).
2. *Haplothrips humilis*. Segment 3 of left antenna, female (holotype).
3. *Haplothrips gowdeyi* (Franklin). Segment 3 of left antenna, female (paratype).
4. *Rhynchothrips tridentatus* (Shull). Segments 6-8 of right antenna.
5. *Rhynchothrips tridentatus*. Head and prothorax, female.
6. *Liothrips caryæ* (Fitch) Hood. Head and prothorax, female (neoholotype).
7. *Dichæothrips brevicollis* gen. et sp. nov. Head and prothorax, female (holotype).

PLATE V.

- Fig. 1. *Diceratothrips picticornis* sp. nov. Head and prothorax, female (holotype).
2. *Diceratothrips picticornis*. Right fore femur, male (allotype).
3. *Polyphemothrips corticis* sp. nov. Head and prothorax, male (allotype).
4. *Cryptothrips gilvipes* sp. nov. Head and prothorax, female (holotype).